GAS ABSTRACTS

A MONTHLY REVIEW OF CURRENT LITERATURE RELATING TO THE GAS INDUSTRY

PREPARED BY THE TECHNICAL AND LIBRARY STAFF OF THE

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GAS ABSTRACTS

This first issue of GAS ABSTRACTS represents the inauguration of a new phase of service to the Gas Industry by the Institute of Gas Technology. For some time the Library and the technical staff have been cooperating in preparing abstracts of papers appearing in technical journals for our own information. GAS ABSTRACTS will be prepared by assembling, once each month, abstracts which have been prepared in this manner.

A major advantage of this service is that it selects for the attention of our staff and the technical personnel of our member companies those articles which seem to be of immediate interest. This selection itself will be one of the greatest advantages of the survey, since it will bring pertinent technical information before the industry while it is current, making it unnecessary for each individual to attempt to cover the entire field of related literature.

The Institute of Gas Technology was established with one of its aims as "the collection and dissemination of scientific information". The collection of scientific information has resulted in the formation of a library which now comprises approximately 5,000 volumes, a large proportion of which is bound periodicals. Well over one hundred scientific journals are received currently. With the publication of GAS ABSTRACTS, we now begin to fulfill the promise of disseminating information to the Gas Industry.

All papers and publications which are abstracted will be available for use in the library. Copies in the form of photostats or microfilms will be provided at cost. The scale of prices will be published in an early issue. Requests for copies should be addressed to the library.

ALUMINA

JELLINEK, M.H. AND FANKUCHEN, I. X-RAY DIFFRACTION EXAMINATION OF GAMMA ALUMINA. *Ind. and Eng. Chem.* 37, *158-163, 1945 (Feb.)*

The structure of gamma alumina has been studied by both wide-angle and low-angle x-ray scattering. Over a short period of heating (e.g. 48 hrs. at 1472°F.) an increasing perfection of structure was found. Both particle and crystallite sizes were increased; the particle diameters were about twice those of the crystallites. It is believed that a primitive cubic unit cell of side 8.4Å is suggested by the data.

--C.H. Riesz.

ASPHALT

McKINNEY, P.V., MAYBERRY, M.G. AND WESTLAKE, H.E. JR. ASPHALTIC PRODUCTS FROM PETROLEUM EXTRACTS. *Ind. and Eng. Chem.* 37, *177-178, 1945 (Feb.)*

The reaction of sulfur with solvent extracts from petroleum stocks leads to an asphalt-like solid whose hardness is much less dependent on temperature than is usual for such materials. It is of promise in filling joints and in caulking.

--Author's abstract.

BITUMENS

ABRAHAM, H. ASPHALTS AND ALLIED SUBSTANCES: THEIR OCCURRENCE, MODES OF PRODUCTION, USES IN THE ARTS, METHODS OF TESTING. *5th ed. 2 vols. N.Y. Van Nostrand, 1945. (Books)*

Division of contents: Pt. 1 - General considerations (history, terminology, origin, etc.) Pt. 2 - Semi-solid and solid bitumens and pyrobitumens; Pt. 3- Tars, pitches and pyrogenous asphalts (methods of production, shale oil, coal tars, water-gas tars, etc.); Pt. 4 - Pyrogenous asphalts and waxes; Pt. 5 - Manufactured products and their uses; Pt. 6 - Methods of testing. The second volume includes a bibliographic section covering 350 pages.

BITUMENS

KATZ, D.L. AND BEU, K.E. NATURE OF ASPHALTIC SUBSTANCES. *Ind. and Eng. Chem.* 37, *195-200, 1945 (Feb.)*

Thin films of asphalt and oil have been examined in the electron microscope in a search for colloidal asphaltene particles. These films seem to be free from particles, but numerous particles appear when suspensions of asphalt in benzene and petroleum ether are examined. Micrographs at 156,000 diameters indicate asphaltene particles, if present in undiluted oils and asphalt, are less than 65 $m\mu$ in diameter.

--Author's Abstract.

BUTADIENE

KOZLOV, N. AND FEDOSEEV, P. CONDENSATION OF ETHYLENE WITH ACETYLENE. *Nat. Petroleum News* 37, *R-224-225, 1945 (Mar. 7)*

Production of butadiene from ethylene and acetylene by vapor phase catalysis. Very low yields are of theoretical interest only. This is a translation of a Russion paper of 1934.

--G.D. Creelman.

CHEMISTRY

A.A.A.S. GIBSON ISLAND CONFERENCES. FRONTIERS IN CHEMISTRY. *Chem. and Eng. News* 23, 182-183, 1945 (Jan. 25)

The program for the Gibson Island conferences, which are to be held from June 11 through Aug. 17, is presented. Of particular interest is the conference on catalysis, June 18-22.

CHEMISTRY

SYMPOSIUM - A CHEMICAL REVIEW OF 1944. *Chem. and Eng. News* 23, 118-156, 1945 (Jan. 25).

A forty page review of 1944 progress in twelve fields, including chemicals, broadly, and petroleum.

--G.D. Creelman

COAL

CONFERENCE ON PROBLEMS IN THE UTILISATION OF SMALL COALS. PROCEEDINGS. *London, British Coal Utilization Research Association, 1944. (book).*

This volume comprises the twenty-eight papers presented at the Conference on problems of utilisation of small coals, which was held in London in November 1943. The papers are divided as were the three sessions. First session - The utilisation of small coals and slurries; Second session - The utilisation of fuels of high inert content; Third session - The upgrading of fuels.

COAL - ANALYSES

BOYER, G. C. ULTIMATE ANALYSIS FROM PROXIMATE: A NEW METHOD. *Power* 89, 173-176 1945 (Mar.).

Glenn C. Boyer, associate engineer, Burns & McDonnell Engineering Co. shows how to convert proximate coal analysis into ultimate, with sufficient accuracy for combustion calculations like those explained in his articles on sure-fire forms for combustion engineering.

--Editor's abstract.

COAL - GASIFICATION

GIBSON, J.W. A COMPLETE GASIFICATION PLANT. *Gas World* 122, 62, 1945 (Jan.20).

A plant of 5000-7000 MCF daily capacity for the complete gasification of coals by internal heating has been designed for the Henry Balfour & Co.Ltd. in England. The feature of the process is an annular chamber in the center of the generator, surrounded by the coking chamber into which coal is charged. The gasification zone, in the center of the annular chamber is charged with coke. During the blow-period air passes up through the gasification chamber and the hot blue gas formed is then passed downward through the empty annular chamber. At the bottom of the latter the hot gases pass into the carbonization zone. In passing upward through the coal charge, the sensible heat of the hot blue gas is transferred to the coal and causes a uniform carbonization at a more rapid rate than in ordinary coking. This is due to the fact that the usually troublesome plastic core is avoided by this method.

--J.J. Sebastian

COAL - HYDROGENATION

BRIDGWATER, R.M. BRITISH RESEARCH ON PETROLEUM SUBSTITUTES: PT. 4 - HYDROGENATION OF COAL. *Petroleum 8, 22-26, 1945 (Feb.)*

British research on the hydrogenation of coal to produce oil is described. The problem consists in eliminating oxygen, sulphur and nitrogen, while at the same time increasing the ratio of hydrogen to carbon in the resultant product. Treatment of coal with hydrogen under a pressure of about 200 atm. and at 450°C (3000 psi at 840°F) represent typical working conditions. The reactions involved are not only hydrogenation in the chemical sense, but also depolymerization and cracking.

The Bergius Process is discussed first, followed by a description of research work carried out at the University of Birmingham and at the Fuel Research Station. The variables of the process, namely temperature, pressure, vehicle and catalyst have been examined in connection with various types of British coals. Depending on the coal used, 50-70% of the coal was found to be converted to liquid products, with a hydrogen consumption 4-6% of the weight of the coal.

A small scale continuous plant, treating about 1 lb. of coal per hour was developed at the Fuel Research Station.

An excellent catalyst for hydrogenation has been developed by removing the iron with acid from small pieces of iron-tin alloy, leaving a skeleton structure behind. This catalyst gave very satisfactory results in hydrogenating coals or coal products.

--J.J. Sebastian

COAL TAR

MILNER, D.W. COAL TAR AS A SOURCE OF ORGANIC CHEMICALS. *Gas Times 42, 30-32, 1945 (Jan. 6)*

Coal tar is a source of many organic chemicals today, and promises to become an increasingly necessary source in the future to supply the plastics industries. After presenting a review of the chemicals obtained from coal tar, the author points out the void which would be created should all coal be completely gasified.

COAL TAR

SACH, J.S. ED. COAL TAR FUELS. *London, Association of Tar Distillers, 1944. (Book)*

A practical treatment of the production, properties and utilization of coal tar fuels. These materials range from fairly fluid products to viscous tars and, finally, to hard pitch. Specifications, transportation and combustion of these fuels are discussed. The pulverization and combustion of pulverizable coal tar fuel (hard pitch) may be of interest.

--C.H. Riesz

COMPRESSORS

FELLER, E.W.F. AIR COMPRESSORS. *New York, McGraw-Hill, 1944 (Book)*

The author, an associate editor of Power, has prepared an extremely useful and practical volume which covers thoroughly the standard reciprocating and rotary air compressors. The theories of compression and intercooling are treated briefly but adequately. Gas turbine problems are also mentioned.

--J.I. Yellott

CORROSION

WILSON, O.B. AN INVESTIGATION INTO CORROSION CAUSED BY AROMATIC BENZOLE ABSORPTION OIL. (PT. I)-*Coke and Smokeless Fuel Age* 7, 34-38, 1945 *(Feb.)*

FRACTIONATION

THE ANALYSIS OF LIQUEFIABLE HYDROCARBONS BY DISTILLATION. *J. Inst. Petroleum* 31, 16-22, 1945 *(Jan.)*

A general procedure for analysis of hydrocarbons by distillation is formulated by a panel of a sub-committee of the Standardization Committee (Great Britain).

--C.H. Riesz

FRACTIONATION

SMITH, V.C., GLASEBROOK, A.L., BEGEMAN, C.R. AND LOVELL, W.G. AUTOMATIC LABORATORY FRACTIONATING COLUMN. *Ind. and Eng. Chem: Anal. Ed.* 17, 47-52, 1945 *(Jan.)*

An automatic laboratory fractionating column, one of a number used for some years for the analytical distillation of close-boiling hydrocarbons, is described in detail. It is made almost entirely of corrosion-resistant metal, including a 10 ft. vacuum jacket. The automatic features include control of heat input to the still pot, collection of the distillate in separate containers, and recording the volume of distillate and the distillation temperature... Detailed drawings of the column itself and of the electrical circuits for automatic control are included.

--Author's abstract.

FRACTIONATION

VERITY, P.S. PRECISE FRACTIONATION IN THE PETROLEUM INDUSTRY. *Nat. Petroleum News* 37, R-169-172, 1945 *(Mar. 7)*

The close fractionation required to produce many of the new petroleum products calls for more exact design and engineering of the multi-tray continuous distillation towers used. Complete analytical data on the hydrocarbon feed stocks for use in making an economic balance between product yield and properties, and cost of equipment is difficult to secure. A method is described for reducing this analytical work by the segregation and study of hydrocarbons by groups. For purposes of calculation each group is treated as a single hydrocarbon.

--Author's abstract.

FUELS - ECONOMIC ASPECTS

WEIL, B.H. ECONOMIC FACTORS TO DETERMINE FUELS OF THE FUTURE. *World Petroleum* 16, 49-51, 1945 *(Feb.)* *Petroleum Engineer* 16, 156-166, 1945 *(Feb.)*

Dr. Weil presents a brief but comprehensive picture of the fuel situation, pointing out that the immediate post-war period will see adequate supplies of low-cost foreign oil. Domestic reserves, known to be about 20 billion barrels, would last only fourteen years at the 1941 production rate. After mentioning the various synthetic oil processes, Dr. Weil points out that

even the best pre-war synthetic process would increase the nation's gasoline bill from 1941's 1.5 billion dollars to between 2 and 5 billions, would require 10 to 20 millions of tons of steel, and would need five or six years for construction of the necessary plants. Post-war cars will need the same kind of gasoline as those of pre-war vintage, and there will be an over-supply of high octane fuel.

--J.I. Yellott

GAS APPLIANCES

COMPLETE HOUSE PROGRAM WILL BUILD LOAD. *Gas Age 95, 29-32, 1945 (Mar. 8)*

Much discussed is the Complete House Program sponsored nationally by The Architectural Forum. It provides for financing major appliances under the realty mortgage. Some dealer groups are opposed to this program because they feel it will divert increasing numbers of appliance sales from retail to wholesale channels. In this comprehensive article, prepared under the direction of A.S. Goldman, director of marketing and research for The Forum, all advantages to the gas utility company are explained, and suggestions given on how gas companies can participate in this post-war building plan.

--Author's abstract

GAS INDUSTRY - ECONOMICS

HARTLEY, H. LEADERS OF THE GAS INDUSTRY MAKE POST-WAR PERIOD AN EPOCH. *Gas World 122, 135-138, 1945 (Feb. 10).*

Under English conditions (with estimated costs and demands for service) cooking, water heating, and space heating by gas would cost just less than half as much as the equivalent service by electricity, but all-gas service would be more costly than combinations of gas and solid fuel, or solid fuel alone.

Author's company has developed improved coke-fired space heaters. There will be available, in the post-war period better gas cookers, gas and coke space heaters, and gas and coke water heaters.

--B. Miller

GAS MANUFACTURE

FRINK, J. CHEMICAL CONTROL IN SMALL GAS PLANTS. THE APPLICATION OF RESULTS OF CHEMICAL ANALYSIS AND METHODS OF TRANSLATING LABORATORY CONTROL TO PLANT RESULTS. *Amer. Gas. Jl. 162, 25-33, 1945 (Feb.)*

Chemical testing for the purpose of control of gas composition is a most necessary and fruitful operation in any carburetted water gas plant. The significance of Orsat Analyses, gas purification by the alkaline iron oxide method, and boiler feed control are discussed.

--J.D. Parent.

GAS MANUFACTURE

HOWIE, G.G. PRODUCTION INVESTMENT PLANNING FOR HOUSE-HEATING EXPANSION. *Gas Age* 95, 17-21, 1945 *(Feb. 22)*

This important study ... shows the economics of using carburetted water gas for house heating loads under certain assumed conditions. These conditions might or might not hold in other situations. Also, there are other ways that the house-heating load may be served without the use of 100 per cent carburetted water gas...
In this study Mr. Howie shows in addition to the ultimate investment which a company might face that a considerable house-heating load can be served with relatively minor plant investment costs by correcting bottlenecks in existing plant facilities.

--Publisher's abstract.

GASES - ANALYSIS

BALIS, E.W., LIEBHAFSKY, H.A. AND BRONK, L.B. DETERMINATION OF CARBON, HYDROGEN AND CHLORINE IN GASEOUS COMPOUNDS. *Ind. and Eng. Chem: Anal. Ed.* 17, 56-60, *1945 (Jan.)*

A method using the microtrain is described for the simultaneous determination of carbon, hydrogen and chlorine in gases or compounds which can be easily volatilized. The combustion is carried out in an excess of air at the temperature of 900°C for carbon and hydrogen; CO_2 and H_2O are determined by conventional absorption methods. Chlorine is absorbed on metallic silver and electrolytic silver crystals at temperatures below 600°C. Combustion was found to be 99.9% complete. Compounds tested included methane, propane, hydrogen chloride, methyl chloride and methylene chloride. Eleven references.

--F. Lister

GASES - ANALYSIS

SCHWARZ, HEINRICH. DIE MIKROGASANALYSE UND IHRE ANWENDUNG. (MICROGASANALYSES AND THEIR APPLICATIONS) *Vienna, Emil Haim, 1935. (Reprinted by Edwards Brothers, 1944) (Book) In German.*

The book begins with a general discussion of fundamental principles in gas analysis and such methods as applied in micro determinations as well as in micro-tests. Since chemical methods are emphasized, a large variety of procedures for gas analysis of blood and metabolism tests is described. Qualitative and quantitative tests of poisonous gases after and before absorption in the human body are listed. A large bibliography is included.

--F. Lister

GASES - ANALYSIS

UHRIG, K., ROBERTS, F.M., AND LEVIN, H. DETERMINING OXYGEN IN HYDROCARBON GASES. *Ind. and Eng. Chem: Anal. Ed.* 17, 31-34, *1945 (Jan.)*

A method is described for determining oxygen in concentrations of 0.001 to 5%. Copper wetted with ammonia-ammonium chloride solution is oxidized by oxygen to copper oxides. Agitation of the resulting solution with copper reduces cupric oxide to cuprous oxide. The dissolved copper is determined iodometrically as a measure of the oxygen in the sample. Saturated and unsaturated hydrocarbons do not interfere. Mercaptans, H_2S and SO_2 must be

removed prior to the analysis by silver nitrate and KOH pellets. An accuracy of about 10% or better is indicated for very low concentrations. Accuracy at higher concentration is presumably higher.

--C.H. Riesz.

GASES - EXPLOSIVE LIMITS

JONES, G.W. AND KENNEDY, R.E. INFLAMMABILITY OF NATURAL GAS: EFFECT OF PRESSURE UPON THE LIMITS. *U.S. Bur. Mines, R.I. 3798. Feb. 1945*

GASES - EXPLOSIVE LIMITS

PREVENTING EXPLOSIVE ATMOSPHERES BY DILUTION WITH INERT GASES. *Nat. Petroleum News* 37, 236-39, *1945 (March 7)*

"Data have been obtained and graphs and tables prepared showing the inflammable areas of all possible mixtures of benzene vapor, air and added carbon dioxide or nitrogen. By means of these graphs and tables the limits of inflammability of complex gaseous mixtures containing benzene may be calculated, and the percentages of oxygen in the mixtures that must not be exceeded to prevent the mixtures from becoming inflammable may be determined."

--Excerpt from article.

GASES - INDUSTRIAL APPLICATIONS

HOFFMANN, A.M. SUBMERGED AIR-GAS BURNER FOR PICKLING TANKS. *Compressed Air* 50, 89-90, *1945 (Mar.)*

Description of an installation by the Submerged Combustion Company of America, Inc., which heats and agitates at the same time.

GASES - INDUSTRIAL APPLICATIONS

SNOW MELTING ANOTHER JOB FOR GAS. *Gas Age* 95, 26-27, *1945 (Mar. 8)*

GASES - INDUSTRIAL APPLICATIONS

TOMES, J.A. TOWN GAS IN THE PROCESSING OF GLASSWARE. *Gas World* 122, 5-9 *(suppl.) 1945 (Feb. 17)*

GASES - PURIFICATION

CREE, K.H. COTTRELL ELECTRICAL PRECIPITATION AS APPLIED TO THE MANUFACTURED GAS INDUSTRY. *Amer. Gas Jl.*162, 27-30, *1945 (Mar.)*

History and general application.

GASES - PURIFICATION

FAIRES, G.L. AND IMPERIAL CHEMICAL INDUSTRIES, LTD. SCRUBBING APPARATUS FOR REMOVING SOLID PARTICLES FROM GASES. BRIT. PAT., 562, 394. *Gas World* 122, 85-86, *1945 (Jan. 27)*

An apparatus is described to remove plastic or molten particles suspended in a gas stream directed through slots or orifices on to a rotating drum. The particles adhering to the drum are removed by a scraper properly located with respect to the orifices. The purified gases pass out of a

housing surrounding the drum. The bottom of the housing is shaped so as to form a hopper for removing the solid removed from the rotating drum by the scraper.

--S.W.Martin

GASES - PURIFICATION

WILLS, F. REMOVING LIQUIDS AND DUST FROM GAS. *Gas 21, 21-28, 1945 (Feb.)*

According to this article, procedures in recovering liquids and dust from natural gas must be considered separately. The author, therefore, first discusses removal of liquids, which he subdivides into water, oil and water and oil. Where absorption or refrigeration at the source is not used, he suggests, for final removal of the liquid, a centrifugal type of separator of new and improved design.
The troublesome dust which clogs the pilot is microscopic and probably present in all mains. After a study of transportation of dust through the gas lines, he discusses various methods of dust removal such as mechanical dry removal, filters, thermal precipitation, and oil fogging, all of which have serious disadvantages. He concludes from studies of particle size of this dust, that the gas served is not as dirty as the layman might be led to believe, and that the pilot light problem can be solved by standardizing the specifications for cleanliness of gas.

--S.W. Martin

GASES - TECHNICAL DATA

SCHUMACHER, H.J. CHEMISCHE GASREAKTIONEN. *Dresden, Steinkopff, 1938. (Reprinted by Edwards Brothers, 1943) (Book) (In German)*

This book is an introduction to the kinetics of reactions among gases. The theoretical part treats the mechanism of reactions from the point of view of both classical statistics and wave mechanics. Theories advanced by various authors are discussed. The elaborate experimental part constitutes a survey of the principal types of gas reactions, such as molecular reactions, atomic reactions, H_2 equilibrium, catalytic reactions and chain reactions. This part is particularly valuable because of the great number of reactions for which the mechanism and kinetic data are given. Bibliographical references are abundant throughout the book. It serves well for the purpose of reference and for informative study of gas reactions.

--E. Lype

GASES - THERMODYNAMICS

JOST, WILHELM. EXPLOSIONS-UND VERBRENNUNGSVORGÄNGE IN GASEN. *Berlin, Springer, 1939. (Reprinted by Edwards Brothers, 1943) (Book) (In German)*

This book, treats the same subject as the well known book by Lewis and Elbe (1938). Besides the considerably greater amount of information given in Jost's book, the emphasis is also on different details. Combustion in engines is discussed more thoroughly. Other topics are concerned with the theories and experimental data of explosion, detonation, flame temperatures, combustion, and ignition. The theoretical material is confined to simple interpretations of experimental results. Ample references are given. The book does not contain tables of thermodynamic data, since these are provided in Justi's book.

--E. Lype

GASES - THERMODYNAMICS

JUSTI, E. SPEZIFISCHE WÄRME ENTHALPIE, ENTROPIE AND DISSOZIATION TECHNISCHER GASE. *Berlin, Springer, 1938. (Reprinted by Edwards Bros., 1944.) (Book) (In German)*

This book, published in 1938, describes the calculation of thermodynamic properties of gases from statistical thermodynamics and the calculation of thermodynamic equilibrium in dissociating gases. The effect of pressure on these properties is shown by means of a discussion of some generally used equations of state. Calculated data are compared with observed data. Most gases encountered in gas engineering are covered by this study, and the data are assembled in numerous tables. The book can be recommended as an introduction to the study of the thermal properties of gases. Its tables are an indispensable tool in the calculation of heat requirements and reactions involving gases.

--E. Lype.

GASES, SEPARATION OF

GREW, K.E. THERMAL DIFFUSION, ITS APPLICATION TO THE SEPARATION OF GASES. *Gas Times, 42, 3, 1945 (Feb. 10); Gas World 245, 221, 1945 (Feb. 14).*

A brief survey of the application of thermal diffusion to the separation of gases, with reference to experiments made by Clusius and Dickel in 1938, who almost completely separated mixtures of different gases, as well as of isotopes, by repeated diffusion between gas streams of nearly equal compositions but different temperatures. (Summary of an address given by Dr. Grew).

--E. Lype.

GASIFICATION - THERMAL DATA

SCHUSTER, F. THERMAL EFFICIENCY IN GAS-MAKING PROCESSES. *Gas Times 42, 28-31, 1945 (Feb. 3) (Abstract of an article from Gas und Wasserfach 86, 299-302, 1943)*

Exact knowledge of the calorific value of the coal gasified is essential to obtain a correct thermal balance on which to base plans for improved operating results. The calorific value may be calculated within a minimum margin of error from the proximate analysis of the coal. The defects of older methods of such calculations are discussed and new arbitrary formulas are proposed which are based on a plot of the calorific value vs. volatile matter for 82 examined coals, ranging in volatile matter content from 20% to 42%.

The agreement between the calorific values actually determined and those calculated is remarkable. The small deviation in percent, is shown for each of the 82 coals tested.

--J.J. Sebastian.

HEAT TREATMENT

CULLEN, ORVILLE E. CONTROLLED ATMOSPHERES AND THEIR APPLICATION TO MALLEABLEIZING. *Industrial Gas 23, 15-17, 1945 (Feb.)*

HYDROCARBONS

WEISS, J.M. ECONOMIC CHANGES IN AROMATIC HYDROCARBONS. *Chem. and Eng. News 23, 45-46, 1945 (Jan. 10)*

HYDROCARBONS - ANALYSIS

ALLEN, C.C. AND DUCKWALL, H.W. SULFURIC ACID EXTRACTION IN GAS OIL HYDROCARBON-TYPE ANALYSIS. *Petroleum Refiner* 24,45-48, 1945 (Feb.)

The authors have applied their "extrapolation method" (*Ind. and Eng. Chem., Anal. Ed.* 16, 558, 727 (1944)) for hydrocarbon type analysis to gas oils. The method gives valuable information about the composition of higher molecular weight hydrocarbon oils. Nine gas oils were analyzed by the authors' method and also by the method of Deanesly and Carleton. Thirteen references are given.

—C.H. Riesz

HYDROCARBONS - HYDROGENATION

MATTOX, W.J. AND GROSSE, A.V. REACTION OF AROMATICS IN THE PRESENCE OF DE-HYDROGENATION CATALYSTS. I. ACTION OF CHROMIA-ALUMINA ON BENZENE, TOLUENE, BUTYLBENZENES AND BIBENZYL. *Jl. Am. Chem. Soc.* 67, 84-86, 1945 (Jan.)

This is the first of a series of papers summarizing data obtained in investigations on benzene and substituted benzenes containing eight carbon atoms in two or more aklyl groups. Chromia-Alumina catalysts containing 4 and 10% chrominium oxide were used at 500-600° to effect dehydrogenation. Benzene and toluene gave biphenyl and anthracene, respectively, without the formation of other aromatics. n-Butyl benzene gave naphthalene as did phenyl n-propyl ketone. p-Di-n-butyl benzene gave phenanthrene. Bi-benzyl gave only stilbene; no phenanthrene or anthracene was found.

--F.L. Estes.

HYDROCARBONS - TECHNICAL DATA

BENEDICT, M., SOLOMON, E. AND RUBIN, L.C. LIQUID-VAPOR EQUILIBRIUM IN METHANE-ETHYLENE-ISOBUTANE SYSTEM. *Ind. and Eng. Chem.* 37, 55-59, 1945 (Jan.)

Liquid-vapor equilibrium data are presented for the system methane-ethylene-isobutane at 37.78° and 71.11°C and 34.02 and 68.05 atmospheres. The data are shown to be in satisfactory agreement with the predictions of a previously published empirical equation of state for light hydrocarbons.

—Author's abstract

HYDROCARBONS - TECHNICAL DATA

GUTTMAN, L. AND PITZER, K.S. TRANS-2-BUTENE. THE HEAT CAPACITY, HEATS OF FUSION AND VAPORIZATION, AND VAPOR PRESSURE. THE ENTROPY AND BARRIER TO INTERNAL ROTATION. *Amer. Chem. Soc. Jl.* 67, 324-327, 1945 (Feb.)

HYDROCARBONS - TECHNICAL DATA

KATZ, D.L. AND SLIEPCEVICH, C.M. CONDENSATES MAY OCCUPY APPARENT NEGATIVE VOLUME IN GAS RESERVOIR. *Oil Weekly* 116, 30-38, 1945 (Feb. 26).

The volume of a unit weight of certain saturated methane-butane mixtures at 70°F. is less than the volume which would be occupied by the methane alone at the same temperature and pressure. This suggests that for some condensate-type fields, removal of less volatile material from the gas produced would leave a greater volume of gas at the reservoir temperature and pressure so that return of the lean gas would maintain the reservoir

pressure throughout the life of the recycling operation. Because it is impractical to avoid removing some methane and ethane, and because these are needed for plant fuel, it is unlikely that in practical operations complete pressure maintenance can be achieved.

--B.Miller

HYDROCARBONS - TECHNICAL DATA

McCURDY, J.L. AND KATZ, D.L. PHASE EQUILIBRIA IN THE SYSTEMS PROPYLENE-ACETYLENE AND PROPANE-ACETYLENE. *Oil and Gas Jl.* 43, 102-104, *1945 (Mar. 17)*

Bubble points and dew points have been determined for five mixtures of propylene and acetylene. The border curves for these mixtures and temperature composition diagrams are presented graphically. Unlike ethane-acetylene and ethylene-acetylene systems, the systems formed by propane-acetylene and propylene-acetylene do not show constant boiling, i.e., azeotropic mixtures, as proved by the data included in this article.

--Author's abstract.

HYDROCARBONS - TECHNICAL DATA

SCHEIBEL, E.G. AND KENNY, F.J. REPRESENTATION OF EQUILIBRIUM CONSTANT DATA. *Ind. and Eng. Chem.* 37, 80-82, *1945 (Jan.)*

A monograph is presented which gives equilibrium constant data for hydrocarbon mixtures (C_1 to C_{14}). For temperatures below 300°F and pressures between 10 and 300 psia, agreement with experimental data is good (2%) while outside these ranges deviation from published data increases to about 10%.

--C.H. Riesz.

INSULATION - CERAMIC

ROSENTHAL, ERNST. PORCELAIN AND OTHER CERAMIC INSULATING MATERIALS. *London, Chapman & Hall, Ltd., 1944 (Book)*

The author has, during his lifetime, been connected with the development and manufacture of electrical porcelain and with the highly specialized field of low loss ceramics, condensers, resistors, etc. He was formerly the technical director of one of the largest porcelain organizations in Europe and he is now engaged as consultant to several British technical porcelain manufacturers and others. In the present volume are discussed in detail the characteristics and testing of the various raw materials, the methods and machineries used in manufacturing ceramic bodies, and the characteristics of the various ceramic materials with special attention to those used in the electrical industry. The book is of intereet to the ceramist and the manufacturer of ceramic bodies, to the electrical engineer who is interested in insulation problems, and to the chemist and chemical engineer using porcelain or high temperature insulation.

--V.S. de Marchi

ISOBUTYLENE

PHYSICAL AND CHEMICAL PROPERTIES OF ISOBUTYLENE. *Petroleum Refiner.* 24, 55-58, *1945 (Feb.)*

This discussion of the properties of isobutylene is a part of a bulletin prepared by the Mellon Institute, Pittsburgh, for Pittsburgh-Des Moines Steel Company. In considering requirements for storing this gas it was

necessary to present additional data which has been authorized for this presentation. The research work was done under the direction of Dr. James B. Garner, whose assistants were Ludwig Adams and Robert M. Stuchell. --Author's abstract (Library has on file the bulletin to which the author refers)

L.P. - GAS

OBERFELL, G.G. AND THOMAS, R.W. PROGRESS IN THE LIQUEFIED-PETROLEUM GAS INDUSTRY IN 1944. *Oil and Gas Jl.* 43, 38-40, 1945 (Jan.6); *Gas* 21, 57-58, 1945 (Feb.); *Butane-Propane News* 7, 23-31, 1945 (Feb.) *Chem. and Eng. News*, 23, 12-15 12-15, 1945 (Jan. 10).

This annual review of the situation with regard to liquefied petroleum gas operations is acknowledged to be the most comprehensive available on this phase of the industry. A bright future appears certain for the L.P.-gas industry, for there are in the U.S. about 15,000,000 homes not connected to gas mains. The industry now serves about 2,000,000 homes. With this market available, industry leaders expect that domestic costumers will increase at the rate of at least 500,000 per year. When one charts the phenomenal growth of this industry...one is inclined to accept this expectation as more than a dream.

--Publisher's abstract.

L.P. - GAS

THOMPSON, P.K. TRENDS IN THE LIQUEFIED-PETROLEUM GAS INDUSTRY AS REFLECTED BY THE INDUSTRY SURVEY. *Petroleum Eng.* 16, 176-184, 1945 (Feb.); *Petroleum Refiner* 24, 134-144, 1945 (Feb.); *L.P.-Gas* 5, 11-14, 1945 (Mar.)

A resume of existing conditions in the industry relative to supply and demand, a look at the immediate future and an evaluation of the industry's status in normal times.

MATHEMATICS, ENGINEERING

CHURCHILL, R.V. MODERN OPERATIONAL MATHEMATICS IN ENGINEERING. *N.Y., McGraw-Hill, 1944. (Book)*

The first four chapters of this book are devoted to the development of some properties of the La place transformation and to the illustration of the use of these properties in solving some ordinary and partial differential equations. The later chapters consider the complex inversion integral and its use in physics and engineering problems and in the study of Sturm-Liouville boundary value problems. A discussion of the theory of functions of a complex variable needed for the inversion integral is included. The main applications are to the solution of boundary value problems arising from problems in the conduction of heat and, to a lesser extent, from problems in mechanical vibrations. The last chapter discusses the analogous finite Fourier transformations. A table of La place transforms is given in one of the appendices.

--M. Friedman

MIDWEST RESEARCH INSTITUTE

GOULD, R.F. MIDWEST RESEARCH INSTITUTE GETTING UNDER WAY IN KANSAS CITY. *Chem. and Eng. News* 23, 432-437, 1945 *(Mar. 10)*

NOZZLES

CALIBRATION OF CRITICAL FLOW NOZZLES. *Industrial Heating* 12, 308, 1945 *(Feb.)*

"In order to have critical flow the nozzle should have a smooth well-rounded entrance and a cylindrical throat section". Non-uniformaties in test results have been reported, and in order to circumvent these, nozzles were fabricated with precision instrument tolerances. Some of these were sent to the Bureau of Standards for calibration, and average results were found to agree within 0.3 to 0.4 per cent, while the maximum spread was 1.25 per cent.

--J.D. Parent

OILS AND FATS

KIRSCHENBAUER, H.G. FATS AND OILS, AN OUTLINE OF THEIR CHEMISTRY AND TECHNOLOGY. *N.Y., Reinhold, 1944. (Book)*

This volume presents a brief, simple survey of the origin, methods of extraction, chemistry, and processing of fats and oils derived from both plants and animals.

--Publisher

ORGANIC SULFUR

TOMES, J.A. REMOVAL OF ORGANIC SULPHUR COMPOUNDS FROM TOWN GAS. *Gas Journal* 245, 185-6, 1945 *(Feb. 7)*

Results are reported on a catalytic process for organic sulfur removal developed by W.C. Holmes & Company, Ltd. The process was installed in small plants of the Stourbridge area having capacities of about 4000 cu. ft. per hour. It involves preheating the gas to 350°C before passing the gas to the catalytic converter containing a copper thiomolybdate suspended catalyst.

Carbon disulfide and carbonyl sulfide are reported almost completely converted to H_2S by this catalytic treatment, while thiophen and mercaptans are destroyed only to the extent of about 10-30% of their total present. The H_2S is removed by the usual iron oxide purifier.

Results presented indicate a reduction in sulfur concentration from approximately 30 grains to 6 grains per 100 cu. ft. The efficiency of removal is dependent primarily, not on the amount, but on the nature of the sulfur compounds in the gas. Cost estimates are also included.

--E.A. Knaggs

PARTICLE SIZE

BRITISH COLLIERY OWNERS RESEARCH ASSOCIATION AND BRITISH COAL UTILISATION RESEARCH ASSOCIATION. DETERMINATION OF PARTICLE SIZE IN SUB-SIEVE RANGE. *B.C.O.R.A. and B.C.U.R.A., 1942 (Book)*

A report on two conferences held in June 1941 and July 1942. Also included is a paper entitled "Methods of Determining Particle Size in Sub-Sieve Range" by D.G. Skinner, S. Boas-Traube, R.L. Brown and P.G.W. Hawksley.

Descriptions are given of the microscopic method; the Andreasen sedimentation pipette method, and the light-extinction sedimentometer designed by H. Haywood. Comparative results are given, and a critical evaluation of the various methods is attempted for the determination of particle sizes in the range 2 to 80 microns. The discussions also cover some aspects of the applications of particle-size measurements and the establishment of standard methods, the limitations of various proposed methods, and the problem of dispersion in suspensions of fine particles. A short bibliography of papers on particle size published since 1938 is given on pages 33-34.

--M. Fisher

PARTICLE SIZE

LANGILLE, R.C., BRAID, P.E. AND KENRICK, F.B. A COMPARISON OF TWO METHODS FOR DETERMINING THE SURFACE AREA OF A POWDER. *Canad. Jl. of Research, Sec. B. 23, 31-39, 1945 (Feb.)*

The surface area of the same barium crown glass powder was determined by two independent methods: (a) comparison of adsorption of methylene blue on the powder and on large measurable broken surfaces; (b) measurement of the projection areas of randomly oriented particles. Although individual results differed rather widely, the averaged results by the two methods agreed surprisingly well: 682 cm^2 per gm. by method (a) and 568 cm^2 per gm. by method (b). The differences may be due to small surface irregularities, among other factors.

--M. Fisher (Taken largely from author's abstract)

PATENTS

GOVERNMENT-OWNED PATENTS AND INVENTIONS OF GOVERNMENT EMPLOYEES AND CONTRACTORS. *Chem. and Eng. News, 23, 438-442, 1945 (Mar. 10)*

PETROLEUM

AMERICAN PETROLEUM INSTITUTE. ANNUAL REPORT OF PROGRESS - FUNDAMENTAL RESEARCH ON OCCURRENCE AND RECOVERY OF PETROLEUM 1943. *New York, A.P.I. 1944. (Book)*

This is a compilation of reprints which have appeared throughout the year in various scientific journals on the A.P.I. projects: Project 37 - The fundamentals of hydrocarbon behavior; Project 27 - Function of water in the production of oil from reservoirs; Project 43 - Transformation of organic material into petroleum. The appendices list all previous papers on all projects and a summary of research results on these projects prior to 1932.

PETROLEUM PRODUCTS

AMERICAN SOCIETY FOR TESTING MATERIALS. A.S.T.M. STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS. METHODS OF TESTING; SPECIFICATIONS; DEFINITIONS; CHARTS AND TABLES, PREPARED BY COMMITTEE D-2 ON PETROLEUM PRODUCTS AND LUBRICANTS. *Philadelphia, A.S.T.M., 1944. (Book)*

PETROLEUM REFINING

BARNEBEY, H.L. PROCESS DEVELOPMENT PROGRAM. *Nat. Petroleum News 37, R-217-222, 1945 (Mar. 7)*

The process development program is aided by resolving it into a definite series of steps. The completion of each step should prove it worthwhile to proceed to the next and should indicate the course of further action. The commercial plant should be visualized before the pilot plant is designed in order that it may be built to supply the requisite data. Mistakes cost less when made early in the program.
In view of the intricate nature of many of the modern petroleum refining processes, the systematic organization of the process development program is recognized as an increasingly important factor in later successful commercial operations. This discussion of the subject is by a representative of the Blaw-Knox Division of the Blaw-Knox Co., which, in the government's synthetic rubber program, engineered the standard design for the GR-S processing plants.

--Author's abstract.

PETROLEUM REFINING

CAULEY, S.P. AND DALTON, S.D. QUALITY OF DISTILLATE FUEL OILS FROM HOUDRY AND T.C.C. OPERATIONS. *Nat. Petroleum News 37, R-165-168, 1945 (Mar. 7)*

PETROLEUM REFINING

FOR FASTER AND FARTHER FLIGHT. *The Lamp 27, 24-26, 1945 (Feb.)*

A graphic description is presented of the newly installed engine test stand at the Bayway (New Jersey) refinery of the Standard Oil Company of New Jersey. In addition to outlining the instrumentation, the article indicates in a popular manner the significance of the high-octane gasoline production program.

--J.I. Yellott

PETROLEUM REFINING

TUTTLE, R.B. HOUDRY CYCLE-TIMING SYSTEM. *Oil and Gas Jl. 43, 120-123, 1944 (Feb.24)*

Precision timing of operating sequences in the Houdry catalytic cracking process are discussed here. The timing apparatus, now it functions in maintaining uniform production rates, and its relation to other control instruments is described.

--Author's abstract.

PETROLEUM REFINING - APPARATUS

MERCIER, S.M. AND COLLINS, R.R. DESIGN AND OPERATION OF HOT-CATALYST ELEVATORS IN THERMOFOR CATALYTIC CRACKING UNITS. *Petroleum Refiner 24, 49-51, 1945 (Feb.)*

PETROLEUM REFINING - FLUID CATALYTIC CRACKING

MURPHREE, E.V., BROWN, C.L., GOHR, E.J., JAHNIG, C.E. MARTIN, H.Z. AND TYSON, C.W. IMPROVEMENTS INCREASE EFFICIENCY OF FLUID CATALYTIC-CRACKING PROCESS. *Oil and Gas Jl. 43, 64-81, 1945 (Mar. 3); Amer. Inst. of Chem. Eng.: Trans. 41, 19-33, 1945 (Feb.)*

The new down-flow type of reaction system is described for the first time. Details of plant design, yields, and operating results are given for the standard fluid catalyst cracking unit, of which 32 have been built in the last three years.

--G.D. Creelman

PETROLEUM RESOURCES

WILSON, R.E. FEARS NO EXHAUSTION OF PETROLEUM SOURCES. *Oil Weekly 117, 30, 1945 (Mar. 12)*

Dr. Robert Wilson thinks that technology will keep the nation on wheels but says that impractical theorists must not be allowed to hypnotize the U.S. into hara-kiri act. "The only thing that can prevent our country from having abundant fuel for many generations at reasonable prices is interference with the free play of technology and competitive enterprise."

--Editor's abstract and quotation from author.

PHYSICAL CHEMISTRY

PALMER, W.G. EXPERIMENTAL PHYSICAL CHEMISTRY. *Cambridge, University press, 1941. (Book)*

This is an elementary laboratory manual containing experimental procedures for testing vapor densities, crystallization phenomena, solubility, properties of solutions and colloidal dispersions, reaction rates and thermochemical effects. Fairly full theoretical discussions and apparatus diagrams accompany the experimental directions.

--J.D. Parent

PRODUCER GAS

DOUGILL, G. THE CLEANING OF PRODUCER GAS. *Gas Times 42, 31-33, 1945 (Feb. 17)*

The author describes his experience with cleaning of producer gas used for heating batteries of Koppers Coke ovens. The dust content of the producer gas contained approximately 12 grains per 100 cu.ft. after leaving the scrubbing system. The regenerators began to be clogged with deposit after several years, which reduced the gas output. The deposit consisted roughly of 40% tarry matters, 40% chlorides derived from coke and 20% ash.
To solve this problem an electric precipitator was installed, which worked excellently for a short period, but then built up a series of stalactites on the plates and electrodes, which could be removed only by scraping. The only alternative appeared to include some additional impurity to the gas, which when precipitated with the rest of the solids would enable the mixture to be handled by known methods. It was found that anthracene oil would help the separation of dust and tar in the electrofilter, lowering the residue in the gas to about 1 grain per 100 c. ft. This solvent has some emulsifying action upon the tarry matter, so that it becomes fluid and can be pumped out. Special oil was recommended in amount of 1½ gals. per

million cu. ft. of gas. The principle of adding additional impurities to convert the existing impurities seems to be of general application, where clean producer gas is required.

—W. Stopowy

PULVERIZERS

LYKKEN, L., ROGERS, F.A. AND EVERSON, W.L. APPARATUS FOR PREPARING SAMPLES FOR ANALYSIS. *Ind. and Eng. Chem., Anal. Ed. 17, 116-118, 1945 (Feb.)*

A sample pulverizer is described which is designed for the rapid preparation of large numbers of 3- to 20-gram solid samples for analysis, with negligible contamination or loss of material. It is essentially a small high-speed hammer mill. A practical apparatus for mixing the pulverized samples, consisting of a weighing-bottle clamp rotated by a motor-driven shaft, is also described.

—Author's abstract.

QUANTUM MECHANICS

REICHENBACH, HANS, PHILOSOPHIC FOUNDATIONS OF QUANTUM MECHANICS. *Los Angeles, University of California Press, 1944. (Book)*

"The division of the book is so planned that the first part presents the general ideas on which quantum mechanics is based; this part, therefore, outlines our philosophical interpretation and summarizes its results. The presentation is such that it does not presuppose mathematical knowledge, nor an acquaintance with the methods of quantum physics. In the second part we present the outlines of the mathematical methods of quantum mechanics; this is so written that a knowledge of the calculus should enable the reader to understand the exposition. The third part deals with the various interpretations of quantum mechanics; it is here that we make use of both the philosophical ideas of the first part and the mathematical formulations of the second. The properties of the different interpretations are discussed, and an interpretation in terms of a three-valued logic is constructed which appears as a satisfactory logical form of quantum mechanics."

—Preface

RADIANT HEAT

HUGHES, R.H. RADIANT GAS HEATING FOR INDUSTRIAL DRYING. *Southern Power and Industry 63, 92-93, 1945 (Mar.)*

A review article.

RADIANT HEAT

ROBERTS, A.L. RECENT APPLICATIONS IN RADIANT GAS HEATING. *Industrial Gas 23, 22, 1945 (Feb.)*

REFRIGERATION

RABER, B.F. AND HUTCHINSON, F.W. REFRIGERATION AND AIR CONDITIONING ENGINEERING. *N.Y. Wiley, 1945. (Book)*

"This book is intended to serve as a reference for practicing engineers and as a text for engineering students. The treatment is rigorous and is

restricted to fundamental principles and rational procedures; refrigeration and air conditioning are treated as sciences rather than as arts. ... The potentialities and limitations of such relatively new applications as the heat pump, radiant heating and porous-coil humidifying are implicit in existing theory; thus the engineer with a sound psychrometric and thermodynamic background can use his knowledge to foresee some of the patterns of the future."

--Preface

RESEARCH, INDUSTRIAL

ALGER, P.L. AND STOKLEY, J. PROGRESS IN ENGINEERING KNOWLEDGE DURING 1944; MATERIALS, DESIGN, APPLICATION. *General Electric Review, 48, 9-56, 1945 (Feb.)*

The annual review of progress in engineering knowledge gives brief highlights of the development in a wide variety of fields. Of particular interest is the introduction prepared by General Electric Vice President, Alger. Design engineering, instrumentation, plastics, gas turbines, heat pumps and lighting are among the topics which are mentioned.

--J.I. Yellott

RESEARCH, INDUSTRIAL

CUTTING THE LAG BETWEEN RESEARCH AND COMMERCIAL REFINING. *Nat. Petroleum News 37, R-187-192, 1945 (Mar. 7)*

New laboratories of Phillips Petroleum Co. provide ample pilot plants and other modern facilities for study of synthetic rubbers and new petroleum products which will materially shorten the periods required for development work.

--Author's abstract

RESEARCH, INDUSTRIAL - GAS

HENSE, H.J. PROGRESS IN DOMESTIC GAS RESEARCH. ADVANCES MADE IN 1944 TOTAL THAT OF PREVIOUS YEARS COMBINED. *Gas 21, 15-18, 1945 (Feb.)*

RESEARCH, INDUSTRIAL - GAS

SCHOCH, E.P. NEW PRODUCTS DEVELOPED FROM NATURAL GAS. *Oil and Gas Jl. 43, 63-64, 1945 (Mar. 10)*

The article presented here is an interesting report of progress of the researches undertaken and prosecuted by University of Texas scientists and engineers to develop methods for more efficient utilization of the vast hydrocarbon reserves of that state. The author outlines some of the work being done and some of the results to date, emphasizing the conversion of natural gas - methane - to industrial and commercial products, particularly ... acetylene, butadiene, olefins and diolefins, etc. ... via the electric discharge.

--Editor's abstract

SOLVENTS

DURRANS, T.H. SOLVENTS. 5TH ED. *N.Y., Van Nostrand, 1944. (Book)*

The title of this book is misleading because it is not a general treatise on solvents, but is very specifically concerned with solvents for cellulose ester lacquers. One-third of the text is devoted to a discussion of

solvent properties in relation to lacquers while the latter two-thirds deals with the specifications and properties of various chemical products as lacquer solvents.

--C.H.Riesz.

THERMAL DATA

PROSEN, E.J., JESSUP, R.S. AND ROSSINI, F.D. HEAT FORMATION OF CARBON DIOXIDE AND OF THE TRANSITION OF GRAPHITE INTO DIAMOND. *Jl. of Research of the Nat. Bur. of Standards, 33, 447-449, 1944 (Dec.)*

A critical recalculation of earlier experimental data on the heat of combustion of graphite and diamond yields a recommended value for the heat of transition of graphite into diamond 453.2 ± 20.3 cal/g mol, and for the heat of combustion of graphite -94052 ± 11 cal/g mol. Bibliography.

—E. Lype.

THERMAL DATA

TRAVERS, M.W. THERMAL DATA FOR USE IN CHEMICAL-TECHNICAL CALCULATIONS. *Journal of the Inst. of Fuel: War Time Bulletin 18, 55-57, 1945 (Dec.)*

In view of recent advances in measuring specific heats and heats of reaction, several tables of thermochemical data are presented as the most reliable now available. These data refer, primarily, to the heats of combustion of C, CO, H_2 and the lower molecular weight paraffins. Sensible heats of the ordinary products of combustion and latent heats of evaporation of water are also tabulated for a range of temperature.

--J.D. Parent

VALVES

BENZ, G.R. AND ST. CLAIR, T.A. DEVELOPMENT AND USE OF EXCESS-FLOW VALVES IN LIQUEFIED PETROLEUM GAS INDUSTRY. *Petroleum Refiner 24, 52-54, 1945 (Feb.)*

The excess-flow check valve, although one of the most important, is the least understood safety device in the liquefied petroleum gas industry. The reasons for this are that each excess-flow valve must be specifically designed and used for a particular application and each valve installation offers its own particular problems. Excess-flow valves of many types are available for a wide variety of uses. Their selection and proper use requires a thorough knowledge of their operation and limitations.

--Author's abstract.

WOOD

BOALS, R.B. ABC'S OF WOOD FUEL. *Power 89, 152-154, 1945 (Mar.)*

Sawdust, hogged fuel and chips are useful byproducts. R.B. Boals, mechanical engineer for Eugene, Oregon, Water Board, details basic fundamentals of wood burning.

--Editor's abstract.

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